CASE STUDY - Cleaning - High Pressure	
TASK TITLE: Cleaning - High Pressure	
Task Description:	Washing an aircraft involves applying an aqueous, somewhat slippery, wash solution to the body of the aircraft, scrubbing the aircraft, washing the solution off, and repeating. Power wash equipment is available and is used for much of the operation. However, parts of the cleaning operation require manual labor such as setting up or adjusting the cleaning equipment; donning the personal protective equipment; and, hauling much of the equipment (high pressure nozzles, scrub brushes, squeegees, fluid containers, etc.). Typical jobs in which Cleaning with high pressure equipment is performed include: • air craft cleaning • cleaning large and small industrial equipment • cleaning the outside of facilities. This case study can be applied to washing done on horizontal, vertical, or overhead surfaces on aircraft, and heavy industrial equipment.
Job Performance Measures Most Often Impacted by Cleaning - High Pressure:	• Quality of the washing job • Speed of completion of the washing task
Typical Employee Comments about Cleaning - High Pressure:	Employees typically complain about discomfort and/or stiffness in the shoulders/neck, hands /wrists/arms, and legs/feet. Primary: All body parts listed above are primary concerns.
Suggested Level II Analysis:	NIOSH lifting equation (for lifting demand of the job), Dynamic Task Analysis; Grip Force Measurement.

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
1. Reaching	• Work location is too high	123. Raise the person • provide an adjustable platform or scaffolding		✓	high	med	med
	• Work location is too far away	38. Move closer to the work location	✓		low	med	med
		132. Remove obstructions	✓	✓	med	med	med
		136. Rotate the work piece • use rotating adjustable platform to house and position industrial parts for cleaning		✓	high	high	high
2. Arm forces: Repeated contraction of the muscles of the arm or holding/ carrying materials	• Pull hoses – Poor housekeeping – Poor floor condition	17. Improve floor condition • repair cracks or gaps in floor • improve housekeeping	✓	✓	high low	med med	med med

Shoulder/Neck (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
	• High pressure sprayer must be manually supported, held or steadied (see Figure 1.1)  **Figure 1.1**	20. Incorporate rest pauses 116. Provide fixture • attach/pivot spray gun on a tripod	✓	 ✓	low med	med med	med high
3. High speed movements	• Rarely occurs	N/A					
4. Head/neck bent or twisted	• Work location is too low or too high	13. Encourage ergonomic work techniques • incorporate rest pauses	 ✓		 low	 med	 med

Hands/Wrists/Arms

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
5. Bent wrists/repeated wrist movements or repeated forearm rotation	• Work location is too high	123. Raise the person • use an adjustable platform or scaffolding		✓	high	med	high
	• Lack of support for tool means employee must bend wrist to direct spray	116. Provide fixture • support/pivot spray gun on tripod		✓	med	med	high
	• Handle shaped trigger requires wrist to bend to direct spray	77. Provide a tool with an appropriate handle angle • modify tool handle		✓	med	med	med
6. Repeated manipulations with fingers	• Tightening bolts or screws with a wrench or with the fingers can cause repetitive finger movements	66. Provide a power tool • use power tool to do the majority of the torquing (when necessary, use manual wrenches only for tightening and final check).		✓	med	med	med
7. Hyper-extension of finger/thumb or repeated single finger activation	• Use of tool with single finger trigger concentrates stress (see Figure 1.2)  Figure 1.2	62. Provide a multi-finger trigger • extend current trigger • provide a tool with a multi-finger trigger		✓ ✓	med med	med med	med med

Hands/Wrists/Arms (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
8. Hand/grip forces	• High pressure sprayer handle must be manually supported, held or steadied	54. Provide a high friction gripping surface • provide a tool handle with a compressible grip surface		✓	med	med	med
		116. Provide support for the tool • support/pivot spray gun on tripod		✓	med	med	med
	• Tool is too heavy	59. Provide a lighter weight tool • provide a sprayer of minimal weight		✓	high	high	med
	• Handle diameter is too large	88. Provide an appropriate handle diameter • provide tool with an appropriate handle diameter between 1"-1.5" (2.5-3.8 cm)		✓	med	med	med
	• Trigger required constant holding	62. Provide multi-Finger trigger • incorporate latch mechanism into trigger design (must comply with safety requirements)		✓	med	med	high

Hands/Wrists/Arms (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
9. High speed hand/wrist/arm movements or vibration, impact, or torque to the hand	• Tool emits high levels of vibration	34. Maintain hand tools/power tools • inspect and repair tool on a regular basis to eliminate unnecessary vibration • wrap handles with vibration dampening grips	✓ ✓		low low	med med	med med
10. Exposure to hard edges	• Tool handle has hard edges	9. Eliminate exposure to hard edges • provide a tool with a smooth handle with no ridges or edges • provide a handle of at least 5" (12.7 cm) in length • wrap handles with padding	 ✓	✓ ✓ 	 med med low	 med med med	 med med med
11. Hand and fingers exposed to cold temperatures	• Work area is too cold	110. Provide shields or barriers from the wind 93. Provide appropriate gloves 12. Encourage appropriate seasonal clothing	 ✓ ✓	✓ 	med low low	med med med	med med med

Back/Torso

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
12. Repeated forward or sideways bending movements	• Work location is too low	31. Lower the person • provide a mobile chair or stool to sit on (e.g. under wing areas) • kneel or squat for short durations when working at low levels (provide adequate knee protection)	✓ ✓	✓	med low	med med	med med
13. Twisting of the lower back	• Work location is blocked or is in an inappropriate orientation	132. Remove obstructions from the work area 136. Rotate the work piece • provide a rotating platform that locks into position to allow small pieces to be rotated.	✓	✓	low high	med high	med high
14. High speed, sudden movements	• Rarely occurs	N/A					
15. Static, awkward back positions	• Rarely occurs	N/A					

Back/Torso (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
16. Lifting forces	• Refer to Lifting case study						
17. Pushing or pulling	• Initial setup requires movement of heavy equipment	48. Provide a cart • provide a powered cart to carry and move the equipment		✓	med	med	med
18. Whole body vibration	• Rarely occurs	N/A					

Legs/Feet

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
19. Fixed position, standing	• Standing surface is hard (see Figure 1.3)  Figure 1.3	96. Provide appropriate shoe inserts	✓		med	med	med
20. Exposure to hard edges on legs, knees, and feet	• Rarely occurs	N/A					
21. Awkward leg postures	• Work location is too low	31. Lower the person • provide a chair or stool to sit on	✓	✓	med	med	med
22. Standing foot pedal	• Rarely occurs	N/A					

Head/Eyes

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		✓ Quality	✓ Productivity
23. Difficult to see/light levels too low/too high	• Light levels are too low	22. Increase light levels • provide adjustable intensity flood light • increase room lighting		✓ ✓	med high	high high	high high
24. Intensive visual tasks, staring at work objects for long periods	• Rarely occurs	N/A					